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Structured Reporting and Reflex Confirmation Enhance Toxicology Oversight in Perinatal Urine Drug Screening: A Six-Month Institutional Review

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Abstract: Background: Urine drug screening (UDS) plays a critical role in identifying both therapeutic and non-prescribed drug exposures, particularly in obstetric patients and their neonates. While immunoassay-based platforms provide rapid screening capabilities, they are limited by potential cross-reactivity and false positives. In October 2023, our institution implemented a scheduled reporting protocol alongside universal maternal screening using the Drug Abuse Screening Test-10 (DAST-10), a validated questionnaire for assessing substance use risk. This approach ensured all patients were screened consistently at the time of admission, helping to minimize subjectivity and support standardized, equitable care delivery. **Methods:** We conducted a retrospective post-implementation review covering January to June 2025, evaluating UDS and confirmation patterns among obstetric inpatients. Data collected included the number of total tests, abnormal results, drug classes identified, whether confirmatory testing was conducted, and concordance between screening and confirmation. Provider documentation and maternal DAST-10 screening responses were reviewed to assess the clinical context of testing decisions. **Results:** A total of 81 UDS tests were completed during the review period. Forty tests (49%) were abnormal, of which 18 were associated with known prescribed medications and did not require confirmatory testing. Confirmatory testing was performed in 22 cases, with 14 (64%) concordant and 8 (36%) discordant with the initial UDS. Discordance was attributed to the timing of sample collection post-medication, potential cross-reactivity, or insufficient documentation to support testing. **Conclusion:** One year after implementing standardized DAST-10 screening and updated biologic testing guidelines, our data suggest improved appropriateness in confirmatory test utilization. The persistence of discordant results underscores the limitations of point-of-care immunoassays and highlights the need for thoughtful clinical correlation. Unlike earlier audits, this focused post-implementation review shows sustained adherence and emphasizes the need for ongoing education, audit feedback, and EMR optimization to minimize unnecessary testing and bias.

Keywords: urine drug screening; perinatal toxicology; DAST-10; confirmatory testing; immunoassay

1. Introduction

Urine drug screening (UDS) is an indispensable component of clinical toxicology, widely utilized across healthcare settings to detect recent exposure to prescribed medications, illicit substances, and drugs of misuse. It serves as a critical tool in clinical decision-making, supporting diagnostic evaluation, medication adherence monitoring, and risk assessment. In this study, we specifically focused on obstetric patients and their neonates, a population in which early detection of in utero or peripartum drug exposure is essential for optimizing maternal and neonatal outcomes and social interventions [1,2]. As the landscape of substance use continues to evolve, the importance of accurate and rapid toxicological screening has grown amid rising concerns over perinatal substance use, polypharmacy, and increased prescribing of opioids and psychotropic medications during pregnancy [3,4].

The MEDTOXScan® system (PROFILE®-V) is a laboratory-based, automated immunoassay platform capable of detecting multiple drug classes in human urine, including opiates, fentanyl, methamphetamines, benzodiazepines, THC, and others. The platform offers several advantages, such as high analytical sensitivity, ease of use in high-throughput environments, reproducibility, and rapid turnaround time, making it particularly well-suited for high-throughput workflows in acute obstetric and neonatal care [5]. However, like all immunoassays, it is susceptible to limitations such as cross-reactivity, variable cutoff thresholds, and potential interference from structurally similar compounds or medication metabolites [6,7]. These analytical pitfalls can produce false-positive results, which may complicate interpretation in cases where multiple medications are administered, especially during labor or perioperative care. Notably, over-the-counter medications such as loperamide and antihistamines have been shown to interfere with certain immunoassays, producing false positives for drugs like fentanyl or methadone [8,9].

To ensure standardized and consistent substance use evaluation at the time of obstetric admission, our institution implemented universal verbal screening using the Drug Abuse Screening Test (DAST-10), a validated 10-item questionnaire designed to identify problematic drug use. Administered by nursing staff on admission, DAST-10 assesses nonmedical or excessive use of substances (excluding alcohol) over the prior 12 months. This universal, structured screening was designed to support objective test ordering and reduce reliance on subjective criteria, aligning with national guidelines that discourage routine biologic testing without clinical indication [10–12]. Consequently, biologic drug screens such as UDS are used selectively, guided by the results of DAST-10, patient-reported history, or clinical presentations such as altered mental status, lack of prenatal care, or suspected misuse (88). As such, UDS results remain preliminary and must be interpreted in context, ideally supported by confirmatory testing (e.g., LC/MS-MS or GC/MS) where warranted [13,14].

Despite clear toxicology guidelines recommending confirmatory testing following presumptive positive screens, adherence to these recommendations remains inconsistent across clinical settings [15,16]. Several factors may contribute to this variability, including limited provider awareness, lack of integration with electronic health records (EHRs), time constraints in acute care, and perceived clinical utility of confirmatory results—particularly in cases where drug exposure is already documented or expected [17,18]. Additionally, in neonatal and maternal health contexts, interpretation of abnormal UDS findings is further complicated by the timing and type of exposure, with potential passive transfer through labor medications or breastfeeding. Our approach aimed to mitigate these issues by combining automated alerts with structured decision points for confirmatory testing—a "screen and reflex" model in which abnormal immunoassay findings trigger physician review and reflex confirmatory testing when uncertainty remains.

This study presents a six-month retrospective review following the implementation of this protocol. We evaluated abnormal UDS frequency, drug class distribution, provider decision-making, and the concordance rate between UDS and confirmatory results.

2. Materials and Methods

2.1. Study Design and Setting

This was a retrospective observational study conducted at a tertiary care medical center. The study analyzed UDS and confirmatory test data collected between 1 January 2025, and 30 June 2025, following the implementation of a standardized drug screening guideline in October 2023. This included a scheduled laboratory reporting protocol and universal verbal screening using the DAST-10 (see Supplementary Materials). The initiative was conducted exclusively in the perinatal care setting, including birthing individuals and their neonates.

2.2. Patient Population

All birthing individuals admitted to labor and delivery during the six-month study period were included, along with their newborns if toxicological testing was ordered. Patients outside the obstetric or neonatal population were not included in this analysis. No exclusions were made based on age, parity, or clinical characteristics.

2.3. Substance Use Screening Protocol

To promote consistent and unbiased screening practices, all obstetric patients were administered the DAST-10 at the time of admission by a nurse. This validated 10-item questionnaire evaluates nonmedical or excessive use of substances (excluding alcohol) over the past year. The use of DAST-10 supported standardized screening across all patients regardless of background, minimizing reliance on subjective judgment. A positive DAST-10 score or other clinical indicators—such as patient disclosure, behavioral concerns, or lack of prenatal care—prompted urine drug screening orders. UDS was thus selectively performed based on structured risk indicators rather than universal testing.

2.4. Urine Drug Screening Procedure

Urine samples were analyzed using the PROFILE®-V MEDTOXScan® Drugs of Abuse Test System (MEDTOX Scientific, Inc., St. Paul, MN), a laboratory-based, instrument-read immunochromatographic assay. This system detects multiple drug classes at established cutoff concentrations (Table 1).

Table 1. Drug classes, analytes, and cutoff concentrations detected by the PROFILE®-V MEDTOXScan® Drugs of Abuse Test System.

Drug Class	Analyte	Cutoff Concentration
Amphetamines	d-Amphetamine (AMP)	500 ng/mL
Barbiturates	Butalbital (BAR)	200 ng/mL
Benzodiazepines	Nordiazepam (BZO)	150 ng/mL
Buprenorphine	Buprenorphine (BUP)	10 ng/mL
Cocaine	Benzoylecgonine (COC)	150 ng/mL
Methamphetamines	d-Methamphetamine (MAMP)	500 ng/mL
Methadone	Methadone (MTD)	200 ng/mL
Opiates	Morphine (OPI)	100 or 2000 ng/mL
Oxycodone	Oxycodone (OXY)	100 ng/mL
Phencyclidine	Phencyclidine (PCP)	25 ng/mL
Propoxyphene	Norpropoxyphene (PPX)	300 ng/mL
Cannabinoids (THC)	11-nor-9-carboxy-Δ^9-THC (THC)	50 ng/mL
Tricyclic Antidepressants	Desipramine (TCA)	300 ng/mL

All results were automatically interpreted by the MEDTOXScan® reader and directly uploaded to the patient's medical record.

2.5. Scheduled Laboratory Reporting Protocol

In October 2023, a structured reporting workflow was introduced. All abnormal UDS results were automatically flagged in EPIC and routed to the ordering provider. Physicians were prompted to review the results and assess whether confirmatory testing was clinically warranted. If the abnormal screen corresponded with documented clinical exposure (e.g., peripartum opioid use or maintenance therapy), providers could opt to defer confirmation. This workflow aimed to reduce unnecessary testing while ensuring follow-up of potentially significant results.

2.6. Confirmatory Testing

When requested, confirmatory testing was performed using liquid chromatography–tandem mass spectrometry (LC/MS-MS) or gas chromatography–mass spectrometry (GC/MS), in accordance with institutional protocols. Confirmations were processed through certified external reference laboratories, and only samples explicitly ordered for confirmation were analyzed. The screening and confirmatory samples were the same. Concordance between UDS and confirmatory results was recorded.

2.7. Newborn Testing Alignment

In accordance with institutional policy, toxicological testing of neonates (via urine or meconium) was conducted only if the maternal UDS was abnormal or if specific clinical circumstances arose (e.g., neonatal symptoms without clear explanation). This mirrored testing policy was co-developed by obstetrics, neonatology, and social work departments to promote consistency and reduce unnecessary newborn testing.

2.8. Data Collection and Outcomes

The following variables were extracted:

- Total number of UDS performed
- Number and percentage of abnormal UDS results
- Number of cases where the UDS aligned with prescribed medications and did not require confirmation
- Number of confirmatory tests performed
- UDS-confirmatory test concordance and discordance
- Documentation from provider notes justifying confirmation or deferral

All data were de-identified and analyzed descriptively using counts and proportions. No inferential statistics were performed due to the small sample size. The study was approved by the institutional review board and met criteria for a waiver of informed consent due to its retrospective, quality improvement-based design.

3. Results

3.1. Screening and Test Volume

During the six-month study period from 1 January to 30 June 2025, a total of 81 urine drug screens (UDS) were performed among obstetric patients admitted for delivery or their neonates. All UDS were ordered selectively, following positive DAST-10 screening, clinical concern, or lack of prenatal care documentation. No universal biologic testing was conducted. In many cases, UDS was prompted by a maternal history of substance use or intrapartum exposure to pain medications.

3.2. Abnormal UDS Findings and Clinical Context

Of the 81 UDS performed, 40 tests (49.4%) were flagged as abnormal, defined by the detection of one or more substances above the assay's cutoff thresholds. Among these:

- 18 cases (45%) were attributed to documented therapeutic or expected medication use, such as fentanyl administered during labor, methadone for opioid use disorder, or benzodiazepines for sedation. Providers documented the rationale in the medical record, and confirmatory testing was not pursued in these cases.
- The remaining 22 cases (55%) underwent confirmatory testing via LC/MS-MS or GC/MS, based on provider discretion.

Of the 22 samples sent for confirmatory testing:

- 14 (63.6%) were concordant, meaning the confirmatory test detected the same substances indicated by the initial screen.
- 8 (36.4%) were discordant, where the confirmatory test either failed to detect the screened substance or identified a different analyte. Discordant results were often associated with peripartum medication exposure, maternal substance use history, or meconium sample limitations.

3.3. Drug Classes Detected

The most commonly identified drug classes among all abnormal screens (n = 58) included (Table 2).

Table 2. Distribution of drug classes detected among abnormal urine drug screens.

Drug Class	Number of Cases
Fentanyl	11
Methamphetamines	6
Opiates (Morphine group)	4
Cocaine	3
Cannabinoids (THC)	6
Benzodiazepines	3
Methadone	4
Oxycodone	3

Some cases involved multiple drug classes detected in a single screen, especially among neonates with maternal substance use histories or recent in-hospital medication exposure.

3.4. Clinical Documentation and Decision-Making

Review of physician notes revealed that:

- In nearly all 18 non-confirmed cases, clinicians attributed the UDS result to expected medication use—commonly intrapartum fentanyl or methadone maintenance therapy. In such instances, the test was considered clinically aligned and no confirmation was requested.
- In discordant cases (n = 8), confirmatory testing was pursued due to uncertain exposure, undocumented use, or unexpected analyte presence. These cases frequently involved medications administered intrapartum (e.g., fentanyl, morphine, benzodiazepines), raising the possibility of passive transplacental transfer or meconium matrix variability.
- Provider comments in discordant cases highlighted limited clinical concern when the detected drug had plausible peripartum explanations (e.g., epidural analgesia) or when maternal DAST-10 was negative.

4. Discussion

This study evaluated UDS outcomes following the implementation of a structured laboratory reporting protocol and selective testing based on standardized maternal screening using the DAST-10. Over a six-month period (January to June 2025, following the October 2023 protocol launch), 81 selectively ordered UDS tests were conducted, with 40 (49.4%) flagged as abnormal. Among these, 22 underwent confirmatory testing, and 8 (36.4%) yielded discordant results—highlighting the complexity of interpreting immunoassay findings in clinically dynamic settings such as labor and delivery or acute inpatient care.

The MEDTOXScan® PROFILE®-V system, utilized in this study, is a validated immunochromatographic assay offering broad detection across major drug classes. According to the manufacturer's documentation, the assay demonstrates high analytical sensitivity and specificity, with greater than 95% concordance for most analytes when compared to gold-standard techniques like LC/MS-MS or GC/MS. Nonetheless, like all immunoassays, it remains susceptible to analytical pitfalls including cross-reactivity with structurally similar substances, near-cutoff concentration artifacts, and interference by endogenous or exogenous metabolites [19]. In our study, discordant results were frequently associated with passive transplacental drug exposure, peri-delivery analgesics, or incomplete medication documentation rather than assay malfunction.

Importantly, this study's screening population was limited to patients who screened positive on the DAST-10, presented with clinical concern, or lacked prenatal documentation—representing a focused, risk-based approach rather than universal testing. By implementing DAST-10 at the point of admission, the institution promoted equitable and objective testing while avoiding over-screening and potential bias in toxicological assessments. This strategy allowed providers to concentrate testing and confirmatory resources where most needed, especially in cases of suspected or undocumented substance use.

Among the 22 UDS cases sent for confirmation, more than half (63.6%) were concordant, validating the initial immunoassay screen and supporting its continued utility as a front-line toxicology tool. The discordant cases, however, were not uniformly indicative of assay failure. Many involved neonates were exposed to maternal medications administered during labor (e.g., fentanyl, benzodiazepines), where brief exposures or specimen timing may account for discrepancies between initial screen and confirmatory results. Pharmacokinetic variability, maternal-fetal transfer, and differential metabolism across specimen types (urine vs. meconium) also contribute to these outcomes.

Furthermore, several discordant results appeared related to in utero fetal exposure to medications administered to the mother (e.g., opioids or benzodiazepines) during the peripartum period, or to incomplete clinical documentation, rather than representing true analytical errors of the immunoassay. For instance, pseudoephedrine and loperamide—common medications in obstetric care—are known to produce cross-reactivity in certain assays, potentially mimicking methamphetamines or fentanyl, respectively [20,21]. These findings reinforce the necessity of interpreting UDS results within a clinical context and supplementing with confirmatory testing when results are discordant or unclear.

The structured reporting protocol introduced in October 2023 proved valuable in improving test stewardship. By automatically flagging abnormal UDS and requiring physician documentation before confirmation, the protocol helped prevent unnecessary confirmatory testing in cases of known therapeutic use, while promoting timely follow-up in ambiguous scenarios. This "screen-and-reflex" model supported efficient resource utilization and diagnostic accuracy.

Despite these strengths, several limitations should be acknowledged. First, as a retrospective analysis, data quality was dependent on provider documentation and completeness of medical records. Second, the selective testing framework limits generalizability beyond risk-identified populations and may underrepresent substance use in asymptomatic individuals. Third, confirmatory testing was outsourced to external reference labs, introducing variability in turnaround time and potentially influencing provider decision-making.

Nonetheless, these findings highlight a pragmatic and balanced approach to perinatal toxicology: combining validated screening instruments (DAST-10), risk-based testing, provider review, and confirmatory assays to support safe, equitable, and clinically appropriate interpretation of UDS results. The continued integration of standardized tools and electronic health record workflows may further reduce disparities, prevent false attribution of substance use, and improve care coordination between obstetric, neonatal, and social services.

5. Conclusions

The implementation of a scheduled laboratory reporting protocol, paired with standardized maternal screening using the DAST-10 tool, improved the clinical interpretation of UDS in a perinatal setting. By flagging abnormal screens for provider review, the system enhanced decision-making, minimized unnecessary confirmatory testing, and supported early identification of potential in utero exposures. Structured screening through DAST-10 further reduced subjective bias in test ordering, promoting equitable and consistent care across obstetric admissions. Despite limitations inherent to immunoassays, over half of confirmatory results aligned with initial UDS findings, reinforcing the utility of immunoassays as efficient first-line toxicology tools when interpreted contextually. Conversely, the observed discordance in a significant proportion of cases underscores the need for reflex confirmation in uncertain scenarios, particularly when documentation is incomplete or pharmacologic exposure is complex. Ongoing efforts to strengthen documentation practices, ensure timely access to confirmatory testing, and foster interdisciplinary coordination remain essential to improving toxicology workflows and maternal–neonatal outcomes.

Supplementary Materials

The additional data and information can be downloaded at: https://oasas.ny.gov/system/files/documents/2019/11/drugabusescreeningtest-10_4-24-18.pdf.

Author Contributions

N.B.: Methodology, Investigation, Formal analysis, Writing—original draft. R.I.: Data collection. K.R.: data collection. P.D.J.: data collection. R.A.: data collection. C.D.: Writing—review & editing. S.D.: Conceptualization, Investigation, Project administration, Writing—review & editing. All authors have read and agreed to the published version of the manuscript.

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Institutional Review Board Statement

This was approved by Baylor IRB with waiver of consent.

Informed Consent Statement

Patient consent was waived due to this being a retrospective review with no Patient Health Information.

Data Availability Statement

Data is available from corresponding author on request.

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Conflicts of Interest

The authors declare no conflict of interest. Given the role as Editorial Board Member, Sridevi Devaraj had no involvement in the peer review of this paper and had no access to information regarding its peer-review process. Full responsibility for the editorial process of this paper was delegated to another editor of the journal.

Use of AI and AI-assisted Technologies

No AI tools were utilized for this paper.

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